MARSH VALLEY JR & SR HIGH SCHOOL WELL (PWS 6030036)
SOURCE WATER ASSESSMENT FINAL REPORT

November 1, 2000

State of Idaho
Department of Environmental Quality

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Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for the Marsh Valley JR & SR High School* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. his assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The Marsh Valley JR & SR High School consists of an artesian well located next to the junior high school. The water has small amounts of manganese, iron, and hydrogen sulfide that cause odor and taste problems. In 1998 the school installed a treatment system as a means to remove the taste and odor, manganese, and iron from the water system. Furthermore, silica sand enters the system from the well bore when the well is pumped at high rates. In addition, two 6500-gallon water storage tanks were installed to help meet the peak demand during the day.

Total coliform bacteria were detected in the water sampling efforts of September 1999. The delineation capture zones include a former underground storage tank site. In September 1998 the well recorded the detection of the inorganic chemicals Barium, Fluoride, and Sodium. These chemicals appear to be naturally occurring and have been detected in the past. None of these inorganic contaminants exceeded their Maximum Contaminant Levels. The final well ranking is high for microbial contamination and moderate for inorganic, volatile organic, and synthetic organic contaminants.

For the Marsh Valley JR & SR High School, source water protection activities should focus on implementation of practices aimed at keeping the distribution system free of microbial contaminants. Disinfection should be considered if microbial problems arise and/or persist. The water system should also be aware of potential risks due to inorganic contaminants from the nearby agricultural activities. Partnerships with state and local agencies should be established to ensure future land uses are protective of groundwater quality. Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Portneuf Soil and Water Conservation District, and the Natural Resources Conservation Service.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

A community with a fully developed source water protection program will incorporate many strategies. For assistance in developing protection strategies please contact the Pocatello Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR MARSH VALLEY JR & SR HIGH SCHOOL, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are contained in this report. The list of significant potential contaminant source categories and their rankings used to develop this assessment is also attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess the over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The Marsh Valley JR & SR High School is a non-community non-transient public drinking water system serving approximately 700 students and faculty, located in Bannock County, north of the City of Arimo (Figure 1). The public drinking water system for Marsh Valley JR & SR High School is comprised of a single artesian well.

The water system is currently using a filtration system to remove odor and taste problems. Without the filtration system, the primary water quality issues would be that of iron, hydrogen sulfide, and manganese that causes odor and taste problems. Although inorganic chemicals (IOC) have been detected in water samples, they remain well below their published Maximum Contaminant Levels (MCLs)

Defining the Zones of Contribution--Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time of travel zones (zones indicating the number of years necessary for a particle of water to reach a pumping well) for water in the aquifer. Dr. John Welhan of the Idaho Geological Survey used analytical models approved by the EPA to determine the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) time of travel zone for the well.

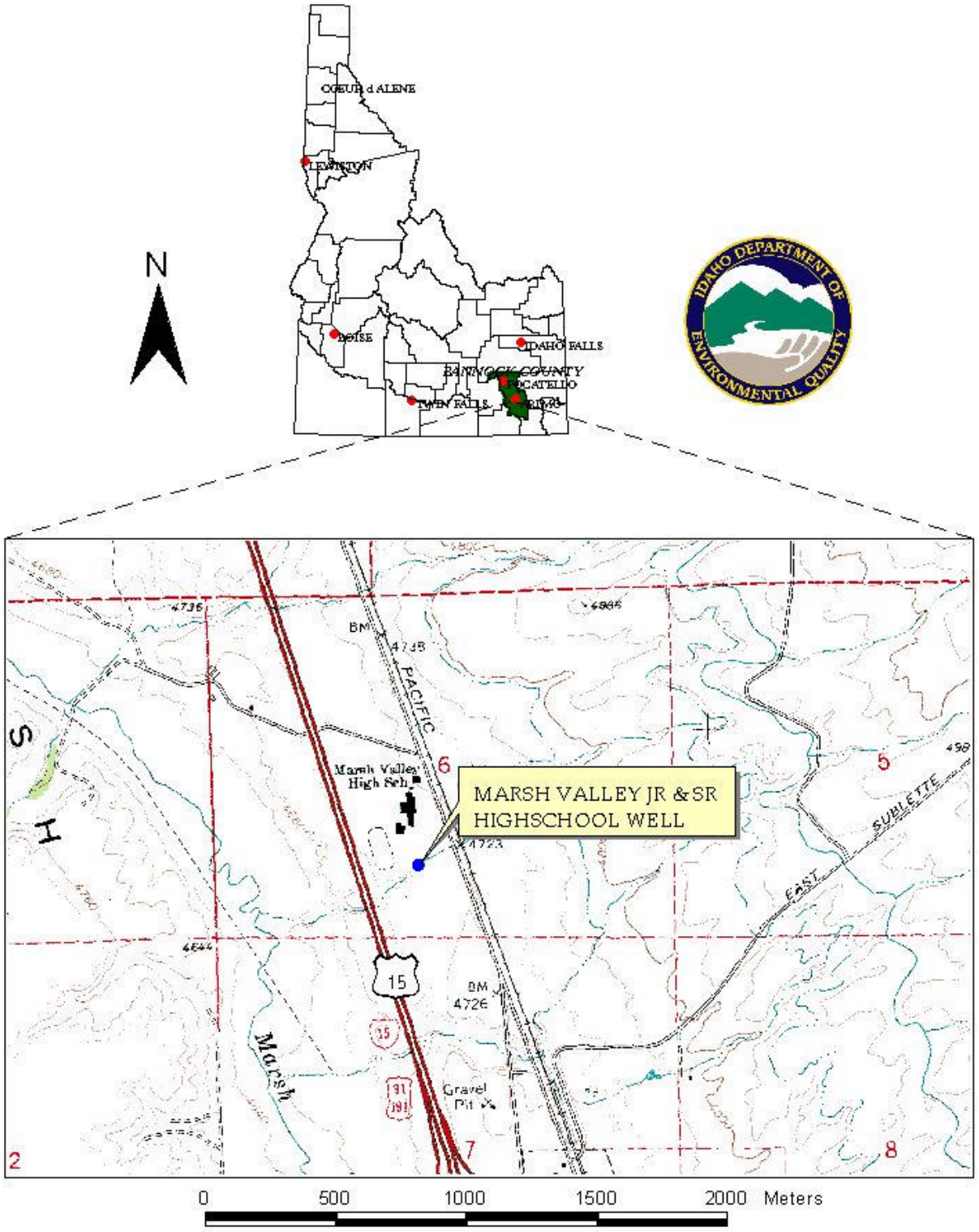
In this situation, where insufficient information was available, the capture zones were delineated using a modified calculated fixed radius method. This method utilized assumed aquifer parameters for the major aquifer types in Idaho (Appendix F, Idaho Wellhead Protection Plan), in combination with well-specific information where available, such as well discharge rate. This information was used in an analytical model to calculate the radial time-of-travel distances for capture zone areas represented by fixed radii. Well-specific information was derived from a variety of sources including sanitary surveys, local well logs, and operator records. The actual data used by Dr. Welhan in determining the zone of contribution are available upon request.

The aquifer, source area, and flow direction for this well is unknown. The well could be pulling water from either undifferentiated Quaternary sands and gravels or older Starlite and/or Salt Lake Formations. Recharge is primarily from precipitation and tributary valley underflow.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Field surveys conducted by DEQ and reviews of a available databases did not identify potential sources of contamination within the delineation areas.

Figure 1 - Geographic Location of Marsh Valley Jr. & Sr. H.S.



It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A contaminant inventory of the study area was conducted during the spring and summer of 2000. This involved identifying and documenting potential contaminant sources within the Marsh Valley JR & SR High School Source Water Assessment Area through the use of computer databases and Geographic Information System (GIS) maps developed by IDEQ.

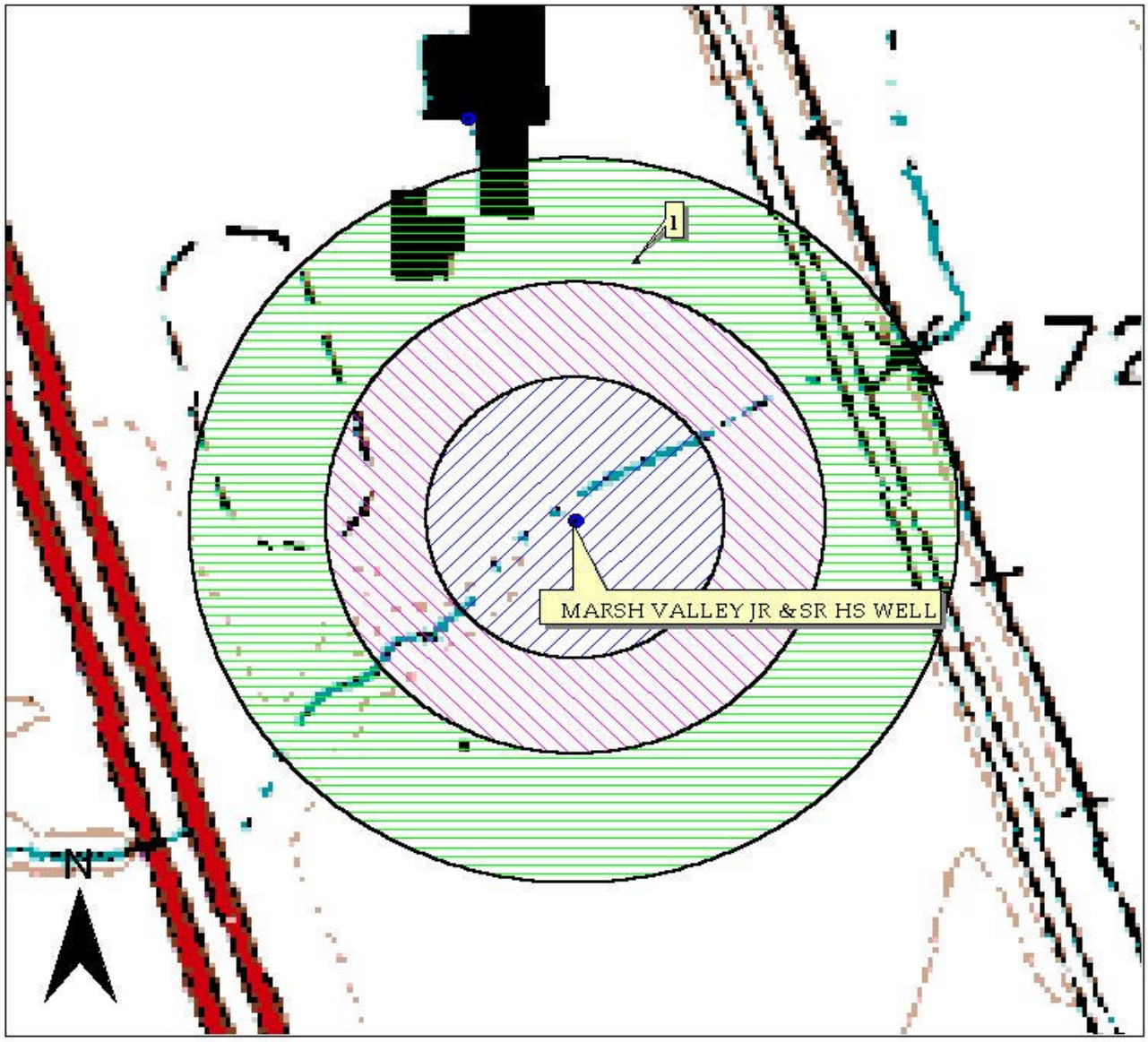
The Marsh Valley JR &SR School well has only one potential contaminant site within the delineated source water areas (Figure 2). This site, located in the 10-year time of travel zone, consisted of two former underground tanks located at the school's bus barn facility. The tanks were removed in August 1997. DEQ records indicate the tank sites were suitable for closure with no further action required. Contaminants of concern are primarily related to petroleum fuels. Table 1 lists the potential contaminants of concern, time of travel zones, and information source. The dominant land use outside the area of the Marsh Valley JR & SR High School is irrigated agricultural land.

Table 1. Marsh Valley JR & SR High School, Potential Contaminant Inventory

SITE #	Source Description	TOT Zone (years)	Source of Information	Potential Contaminants
1	Former Ust site	6-10	Database Inventory	VOC, SOC

IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
TOT = Time of travel (in years) for a potential contaminant to reach the wellhead

Figure 2 - MARSH VALLEY JR & SR HS: Delineation Map and Potential Contaminant Source Location



Section 3. Susceptibility Analyses

The susceptibility of the well to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for the well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

Hydrologic sensitivity was moderate for the well source (see Table 2). The soils in the well source delineation are considered to be in the poor to moderate drainage class. The well log indicates two distinct clay layers (30-55 feet and 65-95 feet), which could act as barriers and retard the vertical transport of contamination. The vadose zone (zone from land surface to the water table) consists of five feet of brown clay above six feet of pea gravel. The pea gravel is underlain by nine feet of coarse gravel in which ground water is first encountered.

Well Construction

Well construction directly affects the ability of the wells to protect the aquifer from contaminants. Lower scores imply a system that can better protect the water. The well system construction score was moderate for the well (Table 2). A 1998 sanitary survey showed that the wellhead and sanitary seal were in compliance with DEQ regulations. The well is located outside the 100-year floodplain.

The Marsh Valley JR & SR High School well was completed on August 6, 1974. Based on the well log, unconfined gravels and sand make up the top 30 feet while low permeable blue clays are dominant in the deeper portions of the well zone. The completed well has a total depth of 150 feet below ground surface. The 16-inch casing extends to 145 feet and crosses a 7-foot pea gravel zone that is bounded by blue clay. The driller's report indicates the 7-foot zone is producing the flowing artesian water. The well is perforated from 80 to 145 feet. A cement grout surface seal extends 18 feet into coarse gravel.

The well was given an additional point because it does not meet current well construction standards.
The Idaho Department of Water Resources (IDWR) *Well Construction Standards Rules (1993)* require all public water systems (PWSs) follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works (1997)* during construction. Various aspects of the standards can be assessed from well logs. Table 1 of the *Recommended Standards for Water Works (1997)* states that 16-inch steel casing requires a thickness of 0.375 inches. The well uses 0.250-inch thick casing. The standards state that screen will be installed and have openings based on sieve analysis of the formation. Standard 3.2.4.1 requires all PWSs to have yield and drawdown tests that last "24 hours or until stabilized drawdown has continued for six hours at 1.5 times" (Recommended Standards for Water Works, 1997) the design pumping rate.

Potential Contaminant Source and Land Use

The school well rated moderate for inorganic chemicals (IOCs) (i.e. nitrate, barium, sodium), and low for synthetic organic chemicals (SOCs) (i.e. pesticides), volatile organic chemicals (VOCs) (i.e. petroleum products), and microbial contaminants. Total coliform bacteria were detected in the water sampling efforts of September 1999.

Final Susceptibility Rating

A detection above a drinking water standard Maximum Contaminant Level (MCL), any detection of a VOC or SOC, or a detection of total coliform or fecal coliform will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. In this case, the final well rankings were high for microbial contamination and moderate for the IOC, VOC, and SOC contaminants.

Table 2. Summary of Marsh Valley JR & SR High School Susceptibility Evaluation

Well	Susceptibility Scores									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
1	M	M	L	L	L	M	M	M	M	H*

H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical
H* = Indicates source automatically scored as high susceptibility due to presence of total coliform bacteria or fecal coliform bacteria in the finished drinking water.

Susceptibility Summary

The water system is currently using a filtration system to remove the odor and taste problems. At this time, the system does not appear threatened by IOCs, VOCs, or SOCs contaminants. However, it is possibly threatened by microbial contaminants.

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective source water protection program is tailored to the particular local source water protection area. A community with a fully developed source water protection program will incorporate many strategies. For the Marsh Valley JR & SR High School, source water protection activities should focus on implementation of practices aimed at keeping the distribution system free of microbial contaminants. The system should consider

using disinfection if microbial problems arise and/or persist. The water system should also be aware of potential risks due to inorganic contaminants from the nearby agricultural activities. Any new businesses that employ potentially harmful chemicals should be monitored as well. Partnerships with state and local agricultural agencies should be established and are critical to success. Due to the time involved with the movement of ground water, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho Department of Agriculture, the Soil Conservation Commission, the Portneuf Soil and Water Conservation District, and the Natural Resources Conservation Service.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Pocatello Regional DEQ Office (208) 236-6160

State IDEQ Office: (208) 373-0502

Website: http://www2.state.id.us/deq

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at 1-800-962-3257 for assistance with wellhead protection strategies.

POTENTIAL CONTAMINANT INVENTORY LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (IDEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100-year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by IDEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

References Cited

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environment Managers, 1997. "Recommended Standards for Water Works."

Idaho Department of Environmental Quality. 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Quantum Group Engineering, 1998, *Marsh Valley JR & SR High School Pilot Study of Ozone Treatment by Aqua-Envirotech Mfg., Inc*

Rocky Mountain Environmental, 1997, *Tier 0 RBCA Report for Marsh Valley School District's Bus Barn*

Welhan, J. 2000. Idaho Geologic Survey. *SWA Capture Zone Delineations, Lower Portneuf and Marsh Valleys*

Attachment A

Marsh Valley JR & SR High School Susceptibility Analysis Worksheet

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report Public Water System Name : MARSH VALLEY JR & SR HIGH SCHOOL Well# : WELL

Public Water System Number 6030036 8/28/00 11:01:14 AM

1. System Construction		SCORE
Drill Date	8/26/74	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1998
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0
	Total System Construction Score	3

2. Hydrologic Sensitivity		
Soils are poorly to moderately drained	YES	0
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0
	Total Hydrologic Score	2

3. Potential Contaminant / Land Use - ZONE 1A			IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND		2	2	2	2
Farm chemical use high	NO		0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES		NO	NO	NO	YES
	Total Potential Contaminant Source/Land Use Score - Zone 1A		2	2	2	2

Potential Contaminant / Land Use - ZONE 1B						
Contaminant sources present (Number of Sources)	NO		0	0	0	0
(Score = # Sources X 2) 8 Points Maximum			0	0	0	0
Sources of Class II or III leacheable contaminants or	YES		2	0	0	
4 Points Maximum			2	0	0	
Zone 1B contains or intercepts a Group 1 Area	NO		0	0	0	0
Land use Zone 1B	25 to 50% Irrigated Agricultural Land		2	2	2	2
	Total Potential Contaminant Source / Land Use Score - Zone 1B		4	2	2	2

Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	YES	1	0	0	
Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2	
	Potential Contaminant Source / Land Use Score - Zone II	3	2	2	0

Potential Contaminant / Land Use - ZONE III						
Contaminant Source Present	YES	0	1	1		
Sources of Class II or III leacheable contaminants or	YES	1	1	1		
Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1		
Total Potential Contaminant Source / Land Use Score - Zone III		2	3	3	0	
Cumulative Potential Contaminant / Land Use Score		11	9	9	4	
4. Final Susceptibility Source Score		7	7	7	7	
5. Final Well Ranking		Moderate	Moderate	Moderate	High	